MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER II, 2022/2023 - (TRIM ID 2220)

PMT0101 – MATHEMATICS I

(Foundation in Information Technology)

11 JULY 2023
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 6 pages with **FIVE** questions.
2. Attempt **ALL** five questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.
4. You are required to write proper steps to obtain maximum marks.

Question 1 [10 marks]

a) Simplify the following expression and write your final answer in the form $a\sqrt{b}$ where a and b are integers.

$\sqrt{72}+\left(\sqrt{3}\times\sqrt{6}\right)$ [2 marks]

b) Rationalize the denominator for $\frac{15}{\sqrt{7}+\sqrt{2}}$ and simplify to the simplest form.

[2 marks]

c) Use Special Product Formula, expand the following expression completely.

$(2a+3b)^3$ [2 marks]

d) Simplify the following expression: $\frac{x^2-y^2}{8x-2y}\times\frac{16x-4y}{(x+y)^2}$.

[2 marks]

e) Express $\frac{-2+3i}{1+2i}$ in the form $a+bi$, where a and b are real numbers.

[2 marks]

Continued...

Question 2 [10 marks]

a) Solve the following quadratic function using quadratic formula. Write your final answer in simplest surd form.

$x(6x-1)=7x+13$

[Hint: $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$]

[3 marks]

b) Find the value of k if the equation $5x^2-9x+k=0$ has two real and equal roots.

[2 marks]

c) Solve the equation $|2x+3|=7$.

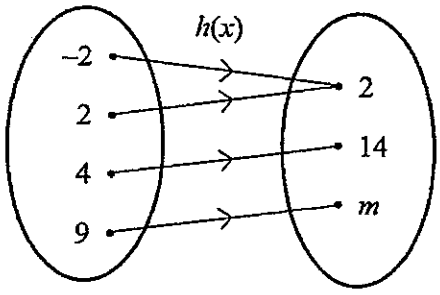
[2 marks]

d) Solve the following inequality: $x(x+2)(x-3)>0$.
Show clearly your Sign Diagram and leave your final answer in interval notation.

[3 marks]

Question 3 [10 marks]

a) The arrow diagram shows the function $h(x)=x^2-2$.



Continued...

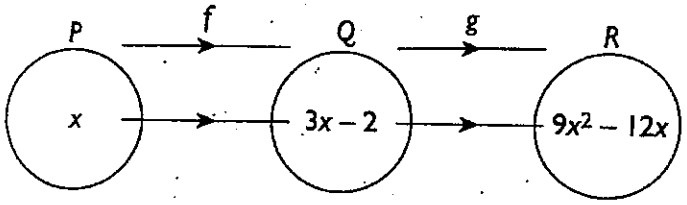
i) State the domain.

ii) Find $h^{-1}(14)$.

iii) Find the value of m.

[2 marks]

b) Diagram below shows a function f that maps set P to set Q and a function g that maps set Q to set R.



Find

i) $gf(-1)$

ii) $f^2(x)$

iii) $f^{-1}(x)$

[4 marks]

c) Given two functions $f(x)=3x-1$ and $g(x)=\dfrac{3x}{x+1}$, $x \neq p$.

i) Find the value of p.

ii) Find the value of x if $f(g(x))=5$

[4 marks]

Continued...

Question 4 [10 marks]

a) Given a quadratic function $f(x)=x^2+2x-15$.

i) Use completing the square method, express f in standard form, $f(x)=a(x-h)^2+k$.

ii) Find the minimum point.

iii) Find the x and y intercepts.

iv) Sketch the graph of f. Show clearly the minimum point and all intercepts.

[4 marks]

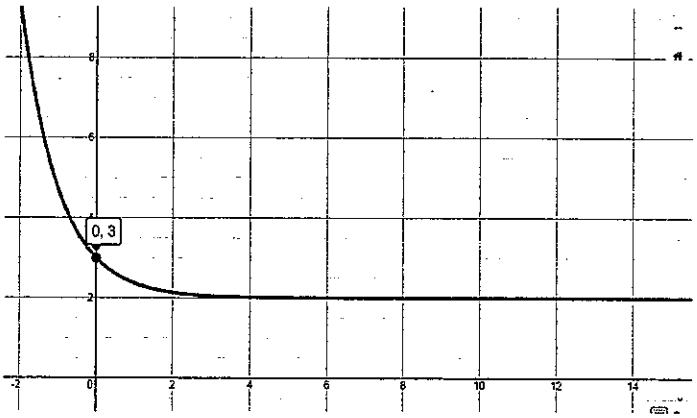
b) Use Remainder Theorem to find the remainder when $f(x)=2x^{10}-5x^5+3x-15$ is divided by $g(x)=x+1$.

[2 marks]

c) Simplify and find the value of $7\log_x x^2-\log_y y^{\frac{8}{3}}+\log_4 16$.

[2 marks]

d)



The figure above shows the graph of function $f(x)=2e^{-x}+k$.

The curve passes through point $(0, 3)$. Find the value of k.

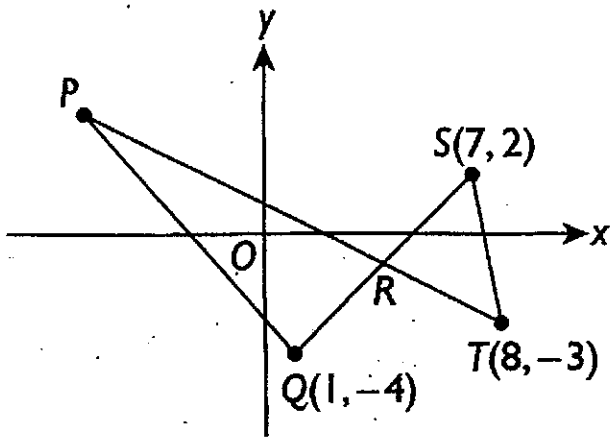
Hence, find the value of $f(-1)$ and leave your answer in 2 decimal places.

[2 marks]

Continued...

Question 5 [10 marks]

a) The diagram shows two triangles, PQR and RST. The straight lines PT intersects the straight line QS at point R.



Given $PR : RT = 5 : 2$ and R is the midpoint of QS.

i) Find the coordinate of points R and P.

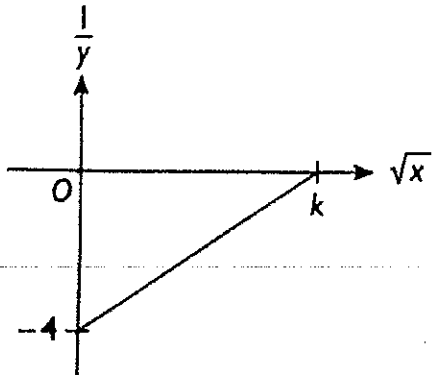
ii) Find the area of triangle QTS.

iii) Find an equation of straight line QS.

[7 marks]

Continued...

b) The variables x and y are related by an equation $y = \dfrac{h}{2\sqrt{x} - 12}$, where h is a constant. A straight line is obtained by plotting $\dfrac{1}{y}$ against $\sqrt{x}$ as shown in the diagram.



i) Express $\dfrac{1}{y}$ in terms of $\sqrt{x}$.

ii) Find the values of h and k.

[3 marks]

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